

Correspondence

SMALL DIRECT CURRENTS AND THE HUMAN BRAIN

DEAR SIR,

The papers of Costain, Lippold and Redfearn (November, 1964, pp. 768-799) raise some interesting questions regarding the effects of polarizing currents when these are passed through the head. The effects of galvanic currents on the CNS of intact animals have been reported by several previous investigators, notably Hermann (1885), Blasius and Schweizer (1893), Hermann and Matthias (1894), and Scheminsky (1924, 1947). In the light of the results obtained by Lippold and Redfearn in humans (*viz.*: elevation of mood when the forehead was positive, quietness when it was negative), it is interesting to note the polarity effects observed in animals by the earlier workers. There was general agreement that when the head was positive and the caudal end negative, a steady direct current was associated with immobility and "galvano-narcosis" (Blasius and Schweizer, 1893). With the polarity reversed (cranial end negative, caudal end positive), the effects were excitatory. An exception to this rule was observed by Silver (1939), when he produced electric anaesthesia with a constant direct current in rats with the cathode in the mouth and the anode in the rectum. This finding conflicts with that of Blasius and Schweizer, who obtained similar results in the same animals with the opposite polarity.

The work of Leduc (1899) in humans would seem to be particularly relevant to the recent report of Redfearn, Lippold and Costain. To quote Tousey (1915): "Cephalic galvanization is suggested by Leduc for cases of cerebral neurasthenia. A large positive electrode is placed at the nape of the neck and a negative electrode 5 by 10 cm. in size on the forehead. The current must be turned on very gradually until 20 mA are applied. This is continued for a quarter of an hour. There is an immediate sense of relief, clearness of thought, and ability to work. The wrong polarity—i.e. with the positive pole upon the forehead—produces a disagreeable sensation of heaviness, slowness of thought and somnolence." It may be noted that, according to Tousey, Leduc used a much larger current than Redfearn, Lippold and Costain. It would be of interest to know if the diametrically opposite effects reported by these workers could be accounted for on these grounds.

In regard to the controlled trial of Costain, Redfearn and Lippold on the effects of polarization in cases of depression, we have analysed their figures in a different way to these investigators, with interesting results. If the psychiatric ratings are considered for the two groups in the first fortnight of the trial, the mean change in symptom score for Group O (-6.75) is not significantly different from that for Group + (-10). In the second fortnight the group which is now treated continues to improve (mean symptom zone change -9); the group in which treatment has been stopped ceases to show much improvement (mean symptom change -2). These two means are significantly different ($t=2.5$; $P=0.02$). In terms of numbers, if a decrease in score of more than 4 is arbitrarily taken to indicate improvement, then 67 per cent. of Group O+ show improvement in the first fortnight. Likewise, 75 per cent. of Group +O improve. In the second fortnight, 75 per cent. of Group O+ continue to improve while only 42 per cent. of Group +O show further improvement. Thus it is only in the placebo period following treatment that there is any marked difference in improvement. Among the other periods there is no difference between placebo and treatment periods.

According to this analysis, there is no evidence that the treatment is better than the placebo. There is only evidence that cessation of treatment is associated with a decreased rate of improvement. The significant result which the authors found by analysis of variance appears to depend on this apparently inexplicable phenomenon.

J. DAWSON.

J. D. MONTAGU.

Runwell Hospital, Wickford, Essex.

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